

565763

BAA Number: USD (ATL)/TSWG 02-Q-4655

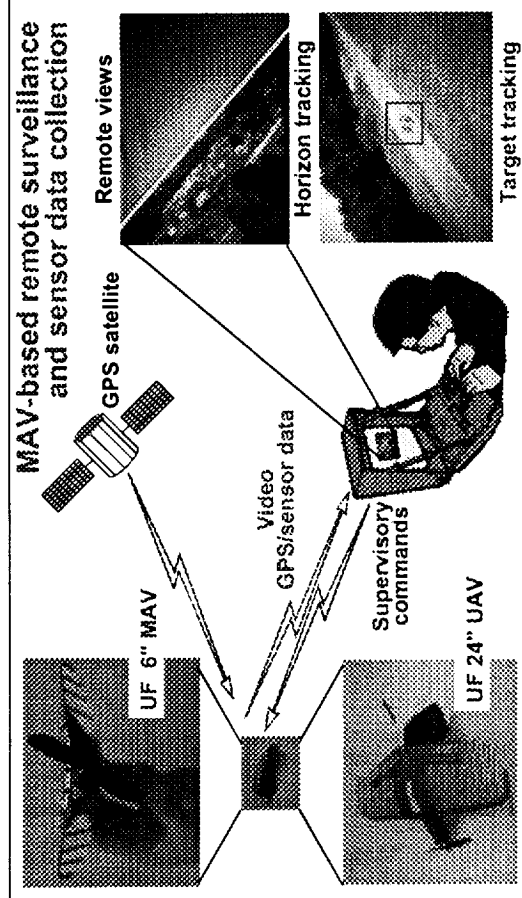
Mission Area: Tagging, Tracking, Locating and Remote Sensors

Requirement Number: 103/ATL-103-MNECHYBA-0011

Proposal Title: Micro Air Vehicles (MAVs) for Surveillance and Remote Sensor Delivery

University of Florida

12/21/2001



Operational Capabilities:

Unique operational capabilities

- Inexpensive, light-weight, compact, stealthy, highly maneuverable platforms for remote surveillance and/or sensor deployment.
- Sensor access to difficult-to-reach and/or hazardous locations.
- Multiple MAV deployment for redundancy/wide area of coverage.
- Improves situational awareness/reduces risks for field personnel.

System specifications

- Electric (silent) hand-launched MAV with on-board camera, GPS and optional chemical/biological agent sensors.
- Autonomy through vision-based stability and GPS navigation.
- Flight times between 30 min. and 1 hour; speeds of 20-50 mph.

Possible interested agencies:

US SOCOM, US Army, US Navy, NASA, DARPA, US Air Force.

Proposed Technical Approach:

Micro Air Vehicles (MAVs) will be developed for tracking individuals, locating terrorist threats, and delivering remote sensors, for surveillance and chemical/biological agent detection.

Tasks

- Develop robust MAV platform capable of carrying sensor payload.
- Develop fully autonomous capabilities for delivery of sensors to remote and distant locations.

Current capabilities and accomplishments

- Operational electric (inaudible) 6-inch MAVs with novel flexible wing, providing superior aerodynamic efficiency and control.
- Vision-based flight stability and control (from on-board cameras).
- International MAV competition winners, 2001, 2000, 1999.
- Previous funding from USSOCOM, NSF and NASA.

Involved technology

Multidisciplinary approach incorporating novel control strategies, computational and experimental fluid dynamics, micro-electronics, vision-based control, and advanced construction technologies.

Rough Order of Magnitude Cost and Schedule:

Schedule (18 months period of performance):

- **Phase I** will focus on platform development and vision-based flight stability and control (9 months period of performance).
- **Phase II** will focus on GPS integration, and autonomous GPS-based navigation (9 months).

ROM Costs:

- Phase I: \$150,000
- Phase II: \$150,000

Deliverables:

Live, autonomous demonstration of MAV deployment; prototype MAV platform; autonomy software and documentation; final technical report.

Corporate Information:

Michael C. Nechyba, ECE Dept., University of Florida, 311 Benton Hall, PO Box 116200, Gainesville, FL 32611-6200
Phone: (352) 392-6503, Fax: (352) 392-4976
Email: nechyba@mil.ufl.edu

BAA Number: USD (ATL)/TSWG 02-Q-4655

Mission Area: Video Human Tracking

Requirement Number: 106/ATL-106-MNECHYBA-002

Proposal Title: Micro Air Vehicle (MAV) Based Human Tracking

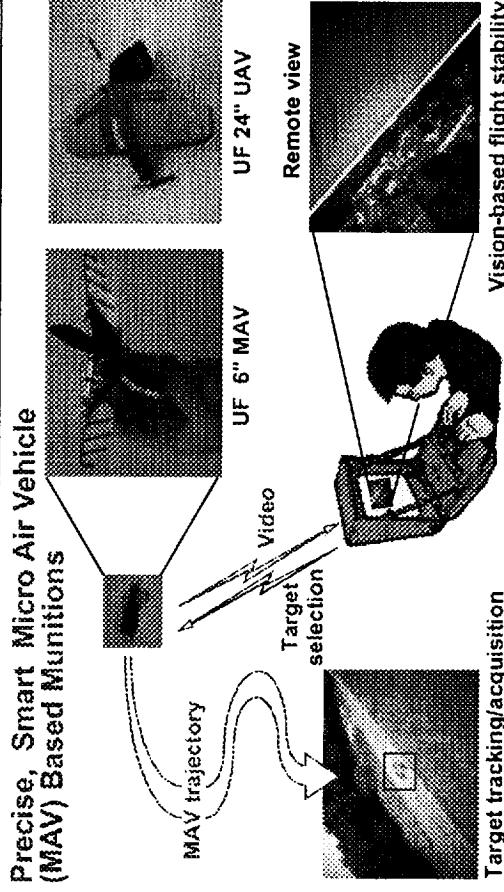
University of Florida

12/21/2001

	<p>Micro Air Vehicle (MAV) Based Human Tracking</p> <p><u>Operational Capability:</u></p> <p>Unique operational capabilities</p> <ul style="list-style-type: none">• Inexpensive, light-weight, compact, stealthy, highly maneuverable platforms for multi-view tracking of humans.• Access to remote/difficult-to-reach locations.• Multiple MAV deployment for redundant, uninterrupted tracking. <p>System specifications</p> <ul style="list-style-type: none">• Electric (silent) hand-launched MAV with on-board video camera and GPS.• Autonomy through vision-based stability and GPS navigation.• Collaborative control of multiple MAVs.• Flight times between 30 min. and 1 hour; speeds of 20-50 mph. <p>Possible interested agencies:</p> <p>US SOCOM, US Army, US Navy, NASA, DARPA, US Air Force.</p>
<p><u>Proposed Technical Approach:</u></p> <p>Micro Air Vehicles (MAVs) will be developed for multi-view airborne video human tracking.</p> <p>Tasks</p> <ul style="list-style-type: none">• Develop MAV platform with on-board cameras/GPS.• Develop autonomous capabilities for tracking moving objects on ground.• Develop collaborative control behaviors. <p>Current capabilities and accomplishments</p> <ul style="list-style-type: none">• Operational electric (inaudible) 6-inch MAVs with novel flexible wing, providing superior aerodynamic efficiency and control.• Vision-based flight stability and control (from on-board cameras).• International MAV competition winners, 2001, 2000, 1999.• Previous funding from USSOCOM, NSF and NASA. <p>Involved technology</p> <p>Multidisciplinary approach incorporating novel control strategies, computational and experimental fluid dynamics, micro-electronics, vision-based control, and advanced construction technologies.</p>	<p><u>Rough Order of Magnitude Cost and Schedule:</u></p> <p>Schedule (18 months period of performance):</p> <ul style="list-style-type: none">• Phase I will focus on platform development and vision-based flight stability and control (9 months period of performance).• Phase II will focus on video-based target selection and tracking (9 months period of performance). <p>ROM Costs:</p> <ul style="list-style-type: none">• Phase I: \$250,000• Phase II: \$250,000 <p><u>Deliverables:</u></p> <p>Live demonstration of MAV deployment/target acquisition; prototype MAV platform; flight/targeting software and documentation; final technical report.</p> <p><u>Corporate Information:</u></p> <p>Michael C. Nechyba, ECE Dept., University of Florida, 311 Benton Hall, PO Box 116200, Gainesville, FL 32611-6200 Phone: (352) 392-6503, Fax: (352) 392-4976 Email: nechyba@mil.ufl.edu</p>

BAA Number: USD (ATL)/TSWG 02-Q-4655
Mission Area: Specialty Munitions
Requirement Number: 311/ATL-311-UFL-005
Proposal Title: Precise, Smart Micro Air Vehicle (MAV) Based Munitions

University of Florida
12/21/2001



Proposed Technical Approach:

Micro Air Vehicles (MAVs) will be developed for precise targeting of small-scale objectives (e.g. small groups of enemy forces).

Tasks

- Develop MAV platform capable of carrying explosive payloads.
 - Develop autonomous capabilities for delivery of munitions to identified targets.
 - Supervised video-based target selection/tracking.
- Current capabilities and accomplishments**
- Operational electric (inaudible) 6-inch MAVs with novel flexible wing, providing superior aerodynamic efficiency and control.
 - Vision-based flight stability and control (from on-board cameras).
 - International MAV competition winners, 2001, 2000, 1999.
 - Previous funding from USSOCOM, NSF and NASA.

Involved technology

Multidisciplinary approach incorporating novel control strategies, computational and experimental fluid dynamics, micro-electronics, vision-based control, and advanced construction technologies.

Operational Capability:

Unique operational capabilities

- Inexpensive, light-weight, compact, stealthy, highly maneuverable platforms for precise, smart targeting of small-scale munitions.
- Targeting of remote/difficult-to-reach objectives.
- Multiple MAV deployment for redundancy/multiple strikes.
- "Friendly fire"/collateral damage mitigation/reductions.

System specifications

- Electric (silent) hand-launched MAV with on-board camera, GPS and small-scale explosives.
- Autonomy through vision-based stability and GPS navigation.
- Flight times between 30 min. and 1 hour; speeds of 20-50 mph.

Possible interested agencies:

US SOCOM, US Army, US Navy, NASA, DARPA, US Air Force.

Rough Order of Magnitude Cost and Schedule:

Schedule (18 months period of performance):

- **Phase I** will focus on platform development and vision-based flight stability and control (9 months period of performance).
- **Phase II** will focus on supervised video-based target selection and tracking (9 months).

ROM Costs:

- Phase I: \$150,000
- Phase II: \$150,000

Deliverables:

Live demonstration of MAV deployment/target acquisition; prototype MAV platform; flight/targeting software and documentation; final technical report.

Corporate Information:

Peter Ifju, AeMES Dept., University of Florida, 231 Aero Bldg., PO Box 116250, Gainesville, FL 32611-6250
 Phone: (352) 392-6744, Fax: (352) 392-7303
 Email: ifju@ufl.edu

BAA Number: USD (ATL)/TSWG 02-Q-4655

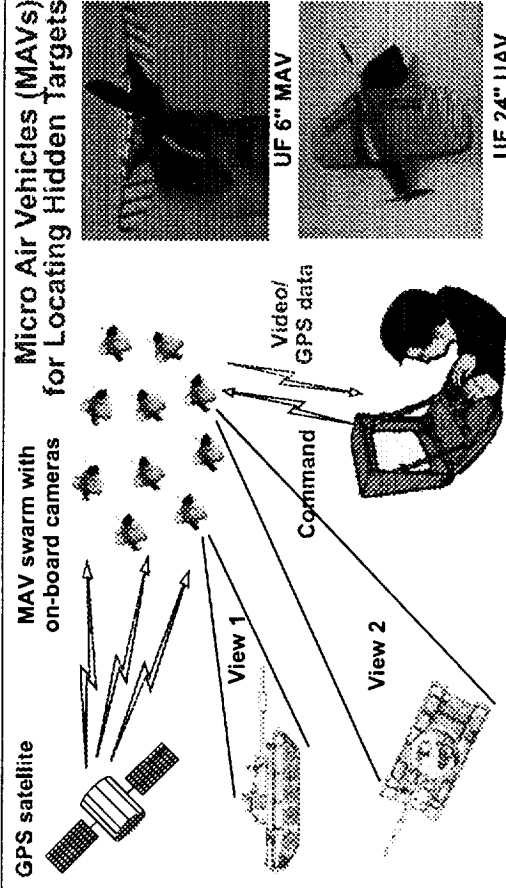
University of Florida

Mission Area: Location and Defeat of Hard or Difficult Targets

12/21/2001

Requirement Number: 200/ATL-200-MNECHYBA-0031

Proposal Title: Micro Air Vehicles (MAVs) for Locating Hidden Targets



Proposed Technical Approach:

Micro Air Vehicles (MAVs) will be developed for multi-view search and localization of hidden ground targets.

Tasks

- Develop MAV platform with on-board video cameras/GPS.
- Develop frequency/color-based models of sought targets.
- Develop collaborative control behaviors.

Current capabilities and accomplishments

- Operational electric (inaudible) 6-inch MAVs with novel flexible wing, providing superior aerodynamic efficiency and control.
- Vision-based flight stability and control (from on-board cameras).
- International MAV competition winners, 2001, 2000, 1999.
- Previous funding from USSOCOM, NSF and NASA.

Involved technology

Multidisciplinary approach incorporating novel control strategies, computational and experimental fluid dynamics, micro-electronics, vision-based control, and advanced construction technologies.

Operational Capability:

Unique operational capabilities

- Inexpensive, light-weight, compact, stealthy, highly maneuverable platforms for multi-view search and localization of hidden ground targets.
- Access to remote/difficult-to-reach locations.
- Multiple MAV deployment for redundant/wide-area coverage.

System specifications

- Electric (silent) hand-launched MAV with video camera and GPS.
- Autonomy through vision-based stability and GPS navigation.
- Collaborative control of multiple MAVs.
- Flight times between 30 min. and 1 hour; speeds of 20-50 mph.

Possible interested agencies:

US SOCOM, US Army, US Navy, NASA, DARPA, US Air Force.

Rough Order of Magnitude Cost and Schedule:

Schedule (18 months period of performance):

- **Phase I** will focus on platform development and vision-based flight stability and control (9 months period of performance).
- **Phase II** will focus on target modeling and localization (9 months period of performance).

ROM Costs:

- Phase I: \$250,000
- Phase II: \$250,000

Deliverables:

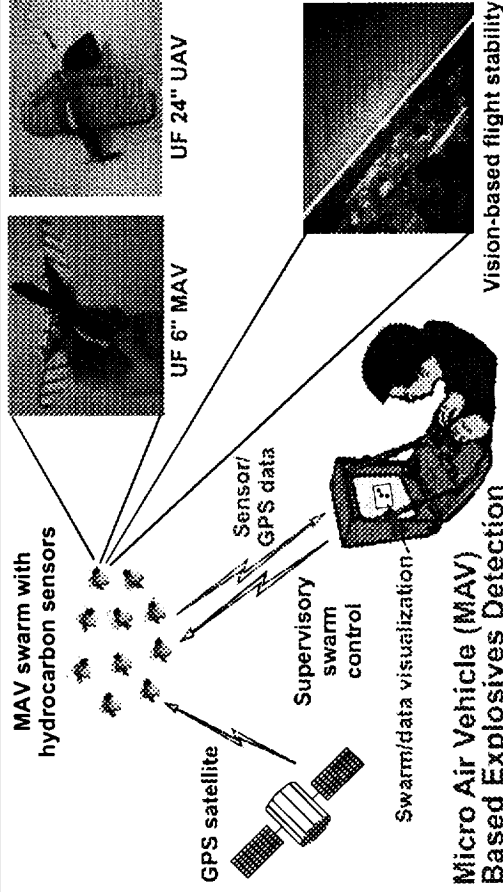
Live demonstration of MAV deployment/target acquisition; prototype MAV platform; flight/targeting software and documentation; final technical report.

Corporate Information:

Michael C. Nechyba, ECE Dept., University of Florida, 311 Benton Hall, PO Box 116200, Gainesville, FL 32611-6200
Phone: (352) 392-6503, Fax: (352) 392-4976
Email: nechyba@mil.ufl.edu

BAA Number: USD (ATL)/TSWG 02-Q-4655
Mission Area: Explosives Detection
Requirement Number: 420/ATL-420-UFL-004
Proposal Title: Micro Air Vehicle (MAV) Based Explosives Detection

University of Florida
12/21/2001



Micro Air Vehicle (MAV) Based Explosives Detection

Proposed Technical Approach:

Micro Air Vehicles (MAVs) will be developed for wide-area detection and localization of TNT explosives.

Tasks

- Develop robust MAV platforms (Aerospace)
- Develop autonomous and collaborative control behaviors (ECE).
- Develop thin-film luminescent chemical sensors (Chemistry).

Current capabilities and accomplishments

- Operational electric (inaudible) 6-inch MAVs with novel flexible wing, providing superior aerodynamic efficiency and control.
- Vision-based flight stability and control (from on-board cameras).
- International MAV competition winners, 2001, 2000, 1999.
- Previous funding from USSOCOM, NSF and NASA.

Involved technology

Multidisciplinary approach incorporating novel control strategies, computational and experimental fluid dynamics, micro-electronics, vision-based control, and chemical sensing with novel luminescent thin-film sensors.

Operational Capability:

Unique operational capabilities

- Inexpensive, light-weight, compact, stealthy, highly maneuverable MAV platforms for detection and localization of TNT explosives.
- Multiple MAV deployment for wide-area coverage.
- "Friendly fire"/collateral damage mitigation/reductions.

System specifications

- Electric (silent) hand-launched MAVs with on-board camera, GPS and TNT explosives sensors.
- Autonomy through vision-based stability and GPS navigation.
- Inter-MAV communication for MAV collaborative flight/control.
- Flight times between 30 min. and 1 hour; speeds of 20-50 mph.

Possible interested agencies:

US SOCOM, US Army, US Navy, NASA, DARPA, US Air Force.

Rough Order of Magnitude Cost and Schedule:

Schedule (18 months period of performance):

- **Phase I** will focus on sensor development and autonomous collaborative control behaviors (12 months performance period).
- **Phase II** will focus on integrated, multiple MAV deployment testing (6 months).

ROM Costs:

- Phase I: \$250,000
- Phase II: \$250,000

Deliverables:

Live demonstration of multiple MAV deployment; prototype MAV platform; flight/targeting software and documentation; final technical report.

Corporate Information:

Peter Ifju, AeMES Dept., University of Florida, 231 Aero Bldg., PO Box 116250, Gainesville, FL 32611-6250
 Phone: (352) 392-6744, Fax: (352) 392-7303
 Email: ifju@ufl.edu